Defaults

Distribution Cable Structure Fractions				
Density Zone	Aerial/Block Cable	Buried Cable	Underground Cable (calculated)	Buried Fraction Available for Shift
0-5	.25	.75	*0*	*.75*
5-100	.25	.75	*0*	*.75*
100-200	.25	.75	*0*	*.75*
200-650	.30	.70	*0*	*.75*
650-850	.30	.70	*0*	*.75*
850-2,550	.30	.70	*0*	*.75*
2,550-5,000	.30	.65	*.05*	*.75*
5,000-10,000	.60	.35	*.05*	*0*
10,000+	.85	.05	*.10*	*0*

CABLE SIZING FACTORS AND POLE SPACING

B18. Distribution Cable Sizing Factors

Definition

The factor by which distribution cable is increased above the size needed to serve a given quantity of demand in order to provide spare pairs for breakage, line administration, and some amount of growth. HM 5.0a divides the number of pairs needed in a distribution cable to meet existing demand by this factor to determine the minimum number of pairs required, then uses the next larger available size cable.

Default Values

Distribution Cable Sizing Factors	
Density Zone	Factors
0-5	.50
5-100	.55
100-200	.55
200-650	.60
650-850	.65
850-2,550	.70
2,550-5,000	.75
5,000-10,000	.75
10,000+	.75

B19. Distribution Pole Spacing

Definition

Spacing between poles supporting aerial distribution cable. HM 5.0a assumes Aerial Cable in the two densest zones is Block and Building Cable, not support on poles.

Default Values

Distribution Pole Spacing	
Density Zone	**Spacing**
0-5	250
5-100	250
100-200	200
200-650	200
650-850	175
850-2,550	175
2,550-5,000	150
5,000-10,000	N/A
10,000+	N/A

GEOLOGY AND CLUSTERS

B20. Distribution Multiplier, Difficult Terrain

Definition

The amount of extra distance required to route distribution and feeder cable around difficult soil conditions, expressed as a multiplier of the distance calculated for normal situations.

Default

1.0

B21. Rock Depth Threshold, inches

Definition

The depth of bedrock, above which (that is, closer to the surface) additional costs are incurred for placing distribution or feeder cable.

Default

24 inches

B22. Hard Rock Placement Multiplier

Definition

The increased cost required to place distribution or feeder cable in bedrock classified as hard, when it is within the rock depth threshold of the surface, expressed as a multiplier of normal installation cost per foot.

Default

3.5

B23. Soft Rock Placement Multiplier

Definition

The increased cost required to place distribution or feeder cable in bedrock classified as soft, when it is within the rock depth threshold of the surface, expressed as a multiplier of normal installation cost per foot.

Default

2.0

B24. Sidewalk / Street Fraction

Definition

The fraction of small, urban clusters that are streets and sidewalks, used in the comparison of cluster area with number of lines to identify cases where high rise buildings are present. To qualify as a small urban cluster, the total land area must be less than .03 square miles and the line density must exceed 30,000 lines per square mile.

Default

0.20

B25. Maximum Analog Copper Total Distance

Definition

The maximum total copper cable length that is allowed to carry voiceband analog signals. When the potential copper cable length exceeds this threshold, it triggers long loop treatment and/or the deeper penetration of fiber based DLC.

Default

18,000 ft.

B26. Feeder steering enable

Definition

An option that, if enabled, instructs the model to adjust each main feeder route direction toward the preponderance of clusters in a quadrant. In the default state, feeder route directions from the wire center are North, East, South, and West.

Default

The default setting is disabled.

B27. Main feeder route/air multiplier

Definition

Route-to-air multiplier applied to main feeder distance when feeder steering is enabled to account for routing main feeder cable around obstacles.

Default

1.27

B27a. Require serving areas to be square

Definition

An option that, if enabled, instructs the model to treat all main clusters as square. In the default state, main clusters are computed as rectangular, with the height to width ratio determined by the process that produces the cluster input data.

Default

The default setting is disabled.

LONG LOOP INVESTMENTS

B28. T1 Repeater Investment, Installed

Definition

The investment per T1 repeater, including electronics, housing, and installation, used for T1 carrier long loop extensions.

Default

$527.00

B29. CO Mux Capacity, installed

Definition

The installed central office multiplexer investment required per road cable used for T1 carrier long loop extensions.

Default

$420.00

B30. Remote Terminal Cabinet and Common Equipment, Installed

Definition

The installed investment per T1 RT used for T1 carrier long loop extensions.

Default

$8,200.00

B31. T1 Channel Unit Investment per Subscriber

Definition

The investment per line in POTS channel units installed in T1 RT used for T1 carrier long loop extensions.

Default

$125.00

B32. Transceiver Investment per RT, Installed

Definition

The installed investment for the transceiver plug-in per T1 RT used to interface with the T1 carrier and to power the repeaters.

Default

$1,170.00

B33. T1 Remote terminal fill factor

Definition

The line unit fill factor in a T1 remote terminal; that is, the ratio of lines served by a T1 remote terminal to the number of line units equipped in the remote terminal.

Default

0.90

B34. Maximum T1s per cable

Definition

Maximum number of T1s that can share a cable without binder group separation or internal shielding.

Default

8

B35. T1 repeater spacing

Definition

Minimum design separation, measured in decibels, on copper cable as a function of the maximum loss

between adjacent repeaters at 772 kHz, and the loss of the copper cable on which the repeaters are installed. Used for T1 carrier long loop extensions.

Default

32.0 dB

B36. Aerial T1 Attenuation

Definition

The copper cable attenuation for the design of T1 circuits at an operational frequency of 772 kHz and a maximum temperature of 140 degrees Fahrenheit. Based on air core PIC (Plastic Insulated Conductor) cable.

Default

6.3 dB/kft.

B37. Buried T1 Attenuation

Definition

The copper cable attenuation for the design of T1 circuits at an operational frequency of 772 kHz and at normal operating temperature. Based on water blocking compound filled cables, using solid PIC insulation.

Default

5.0 dB/kft.

SERVING AREA INTERFACE INVESTMENT

B38. Serving Area Interface (SAI) Investment

Definition

The installed investment in the SAI that acts as the physical interface point between distribution and feeder cable.

Default Values

SAI Investment		
SAI Size	Indoor SAI	Outdoor SAI
7200	$9,656	$10,000
5400	$7,392	$8,200
3600	$4,928	$6,000
2400	$3,352	$4,300
1800	$2,464	$3,400
1200	$1,776	$2,400
900	$1,232	$1,900
600	$888	$1,400
400	$592	$1,000
200	$296	$600
100	$148	$350
50	$98	$250

DEDICATED CIRCUIT INPUTS

B39. Percentage of Dedicated Circuits

Definition

The fractions of total circuits included in the count of total private line and special access circuits that are DS-0 and DS-1 circuits, respectively. The fraction of DS-3 and higher capacity circuits is calculated by the model as (1 - fraction DS0 - fraction DS1). The equivalence between the three circuit types -- that is, DS-0, DS-1, and DS-3 -- and wire pairs is expressed by Parameter B36. Note that the model assumes the circuit counts are expressed in terms of the number of DS-0, DS-1, and DS-3, circuits, respectively, not voice grade circuits or DS-0 equivalents. Thus if the data source expresses all circuit counts as DS-0 equivalents, as is the case with the existing ARMIS 43-08 report used as the source of special access line counts, the values for this parameter should be set to 100% DS-0 and 0% DS-1.

Default

Percentage of Dedicated Circuits	
DS-0	DS-1
100%	0%

B40. Pairs per Dedicated Circuit

Definition

Factor expressing the number of wire pairs required per dedicated circuit classification.

Default

Pairs per Dedicated Circuit		
DS-0	DS-1	DS-3
1	2	56

WIRELESS INVESTMENT

B41. Wireless Investment Cap Enable

Definition

When enabled, invokes wireless investment cap for distribution plant investment calculations. In the default mode, the model does not impose the wireless cap.

Default

The default setting is disabled.

B42. Wireless Point to Point Investment Cap – Distribution

Definition

Per-subscriber investment for hypothetical point to point subscriber radio equipment.

Default

$7,500

B43. Wireless Common Investment

Definition

Base Station Equipment investment for hypothetical broadcast wireless loop system.

Default

$112,500

B44. Wireless Per Line Investment

Definition

Per-subscriber investment for hypothetical broadcast wireless loop systems, including customer premises equipment and per subscriber share of base station radios.

Default

$500

B45. Maximum Broadcast Lines per Common Investment

Definition

Capacity of hypothetical base station common equipment, in lines.

Default

30

FEEDER INPUT PARAMETERS

COPPER PLACEMENT

B46. Copper Feeder Structure Fractions

Definition

The relative amounts of different structure types supporting sheath feet of copper feeder cable in each density zone. Aerial feeder cable is attached to telephone poles, buried cable is laid directly in the earth, and underground cable runs through underground conduit.

Default Values

Copper Feeder Structure Fractions			
Density Zone	**Aerial/Block Cable**	**Buried Cable**	**Underground Cable (calculated)**
0-5	.50	.45	*.05*
5-100	.50	.45	*.05*
100-200	.50	.45	*.05*
200-650	.40	.40	*.20*
650-850	.30	.30	*.40*
850-2,550	.20	.20	*.60*
2,550-5,000	.15	.10	*.75*
5,000-10,000	.10	.05	*.85*
10,000+	.05	.05	*.90*

**Note: Buried Fraction Available for Shift for Copper Feeder Structure Fractions is taken from the Buried Fraction Available for Shift for Fiber Feeder Structure Fractions.*

B47. Copper Feeder Manhole Spacing, feet

Definition

The distance, in feet, between manholes for copper feeder cable.

Default Values

Copper Feeder Manhole Spacing, feet	
Density Zone	**Distance between manholes, ft.**
0-5	800
5-100	800
100-200	800
200-650	800
650-850	600
850-2,550	600
2,550-5,000	600
5,000-10,000	400
10,000+	400

B48. Copper Feeder Pole Spacing, feet

Definition

Spacing between poles supporting aerial copper feeder cable.

Default Values

Copper Feeder Pole Spacing	
Density Zone	**Spacing, ft.**
0-5	250
5-100	250
100-200	200
200-650	200
650-850	175
850-2,550	175
2,550-5,000	150
5,000-10,000	150
10,000+	150

B49. Copper Feeder Pole Investment

Definition

The installed cost of a 40' Class 4 treated southern pine pole.

Default Value

Pole Investment	
Materials	$201
Labor	$216
Total	$417

B50. Inner Duct Material Investment per foot

Definition

Material cost per foot of inner duct.

Default Value

$0.30

FIBER PLACEMENT

B51. Fiber Feeder Structure Fractions

Definition

The relative amounts of different structure types supporting fiber feeder cable in each density zone. Aerial feeder cable is attached to telephone poles, buried cable is laid directly in the earth, and underground cable runs through underground conduit.

Default Values

Fiber Feeder Structure Fractions				
Density Zone	Aerial/Block Cable	Buried Cable	Underground Cable (calculated)	Fraction of Buried Available for Shift
0-5	.35	.60	.05	.75
5-100	.35	.60	.05	.75
100-200	.35	.60	.05	.75
200-650	.30	.60	.10	.75
650-850	.30	.30	.40	.75
850-2,550	.20	.20	.60	.75
2,550-5,000	.15	.10	.75	.75
5,000-10,000	.10	.05	.85	.75
10,000+	.05	.05	.90	.75

B52. Fiber Feeder Pullbox Spacing, feet

Definition

The distance, in feet, between pullboxes for underground fiber feeder cable.

Default Values

Fiber Feeder Pullbox Spacing, feet	
Density Zone	**Distance between pullboxes, ft.**
0-5	2,000
5-100	2,000
100-200	2,000
200-650	2,000
650-850	2,000
850-2,550	2,000
2,550-5,000	2,000
5,000-10,000	2,000
10,000+	2,000

B53. Buried Fiber Sheath Addition, per foot

Definition

The cost of dual sheathing for additional mechanical protection of buried fiber feeder cable.

Default Value

$0.20/foot

SIZING FACTORS

B54. Copper Feeder Cable Sizing Factors

Definition

The factor by which copper feeder cable capacity is increased above the size needed to serve a given quantity of demand in order to provide spare pairs for breakage, line administration, and some amount of growth. Calculated as the ratio of the number of assigned pairs to the total number of available pairs in the cable.

Default Values

Copper Feeder Cable Sizing Factors	
Density Zone	**Factors**
0-5	.65
5-100	.75
100-200	.80
200-650	.80
650-850	.80
850-2,550	.80
2,550-5,000	.80
5,000-10,000	.80
10,000+	.80

B55. Fiber Feeder Cable Sizing Factor

Definition

Percentage of fiber strands in a cable that is available to be utilized.

Default

Fiber Feeder Cable Sizing Factor	
Density Zone	**Factor**
0-5	1.00
5-100	1.00
100-200	1.00
200-650	1.00
650-850	1.00
850-2,550	1.00
2,550-5,000	1.00
5,000-10,000	1.00
10,000+	1.00

CABLE COSTS

B56. Copper Feeder Cable; $/ foot, per pair-foot

Definition

The cost per foot ($/foot) and per pair-foot of copper feeder cable, as a function of cable size, including the costs of engineering, installation, and delivery, as well as the cable material itself. The copper investment per pair-foot is used in estimating comparative life-cycle costs for copper feeder.

Default Value

Copper Feeder Investment	
Cable Size	**$/foot (u/g & aerial)**
4200	$29.00
3600	$26.00
3000	$23.00
2400	$20.00
1800	$16.00
1200	$12.00
900	$10.00
600	$7.75
400	$6.00
200	$4.25
100	$2.50
Copper Investment per Pair – foot	
$ 0.0075 / pair-ft.	

B57. Fiber Feeder Cable; $/foot, per strand-foot

Definition

The cost per foot ($/foot) and per strand-foot of fiber feeder cable, as a function of cable size, including the costs of engineering, installation, and delivery, as well as the cable material itself. The fiber investment per strand-foot is used in estimating comparative life-cycle costs for copper and fiber feeder.

Default Value

Fiber Feeder Investment	
Cable Size	**$/foot (u/g & aerial)**
216	$13.10
144	$9.50
96	$7.10
72	$5.90
60	$5.30
48	$4.70
36	$4.10
24	$3.50
18	$3.20
12	$2.90
Fiber Investment per Strand – foot	
$ 0.10 / fiber-ft.	

DIGITAL LOOP CARRIER EQUIPMENT

B58. DLC site and power per remote terminal

Definition

The investment associated with site and power for the remote terminal of a Digital Loop Carrier (DLC) system.

Default Value

Remote Terminal Site and Power	
High Density DLC	Low Density DLC
$3,000	$1,300

B59. Maximum Line Size per Remote Terminal

Definition

The maximum number of lines supported by the initial line module of a remote terminal.

Default

Maximum Line Increment per Remote Terminal	
High Density DLC	Low Density DLC
672	120

B60. Remote terminal sizing factor

Definition

The line unit sizing factor in a DLC remote terminal, that is, the; the ratio of lines served by a DLC remote terminal to the number of line units equipped in the remote terminal.

Default Value

Remote Terminal Sizing Factors	
High Density DLC	Low Density DLC
0.90	0.90

B61. DLC initial common equipment investment

Definition

The cost of all common equipment and housing in the remote terminal, as well as the fiber optics multiplexer required at the CO end for the initial line module of the DLC system (assumes integrated digital loop carrier (IDLC) with a GR-303 interface to the local digital switch).

Default Value

Remote Terminal Initial Common Equipment Investment	
High Density DLC	Low Density DLC
$66,000	$16,000

B62. DLC channel unit investment

Definition

The investment in channel units required in the remote terminal of the DLC system.

Default Value

DLC Type	DLC channel unit investment per unit	
	POTS Channel Unit	Coin Channel Unit
High Density	$310	$250
Low Density	$600	$600

B63. DLC Lines per CU

Definition

The number of lines that can be supported on a single DLC channel unit.

Default Value

DLC Type	DLC Lines per channel unit	
	POTS	Coin
High Density	4	2
Low Density	6	6

B64. Low Density DLC to High Density DLC Cutover

Definition

The threshold number of lines served, above which the High Density DLC will be utilized.

Default

480

B65. Fibers per remote terminal

Definition

The number of fibers connected to each DLC remote terminal.

Default Value

Fibers per Remote Terminal	
High Density DLC	Low density DLC
4	4

B66. Optical Patch Panel

Definition

The investment required for each optical patch panel associated with a DLC remote terminal.

Default

Optical Patch Panel	
High Density DLC	Low density DLC
$1000	$1000

B67. Copper Feeder Maximum Distance, feet

Definition

The feeder length above which fiber feeder cable is used in lieu of copper cable. The value must be less than 18,000 feet.

Default Value

9,000 feet

B68. Common Equipment Investment per Additional Line Increment

Definition

The cost of the common equipment required for each additional line module in a remote terminal.

Default

Common Equipment Investment per Additional Line Increment	
High Density	Low Density
672 Lines	120 Lines
$18,500	$9,400

B69. Maximum Number of Additional Line Modules per Remote Terminal

Definition

The number of line modules (in increments of 672 or 120 lines) that can be added to a remote terminal.

Default

Max. # Add. Line Modules/RT	
High Density DLC	Low density DLC
2	1

COPPER MANHOLE INVESTMENT

B70. Manhole Investment, materials and labor

Definition

The installed cost of a prefabricated concrete manhole, including backfill and restoration. All the non-italicized costs in the following table are separately adjustable.

Default Value

Copper Cable Manhole Investment						
Density Zone	Materials	Frame & Cover	Site Delivery	Total Material	Excavation & Backfill	Total Installed Manhole
0-5	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
5-100	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
100-200	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
200-650	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
650-850	$1,865	$350	$125	*$2,340*	$3,200	*$5,540*
850-2,550	$1,865	$350	$125	*$2,340*	$3,500	*$5,840*
2,550-5,000	$1,865	$350	$125	*$2,340*	$3,500	*$5,840*
5,000-10,000	$1,865	$350	$125	*$2,340*	$5,000	*$7,340*
10,000+	$1,865	$350	$125	*$2,340*	$5,000	*$7,340*

B71. Dewatering factor for manhole placement

Definition

Fractional increase in manhole placement to reflect additional cost required to install manholes in presence of shallow water table.

Default

0.20

B72. Water table depth for dewatering

Definition

Water table depth at which dewatering factor is invoked.

Default

5.00 feet

FIBER PULLBOX INVESTMENT

B73. Fiber Feeder Pullbox Investment

Definition

The investment per fiber pullbox in the feeder portion of the network.

Default Values

Fiber Pullbox Investment		
Density Zone	**Pullbox Materials**	**Pullbox Installation**
0-5	$280	$220
5-100	$280	$220
100-200	$280	$220
200-650	$280	$220
650-850	$280	$220
850-2,550	$280	$220
2,550-5,000	$280	$220
5,000-10,000	$280	$220
10,000+	$280	$220

SWITCHING AND INTEROFFICE TRANSMISSION PARAMETERS

END OFFICE SWITCHING

B74. Switch real-time limit, busy hour call attempts

Definition

The maximum number of busy hour call attempts (BHCA) a switch can handle. If the model determines that the load on a processor, calculated as the number of busy hour call attempts times the processor feature load multiplier, would exceed the switch real time limit multiplied by the switch maximum processor occupancy, it will add a switch to the wire center.

Default Values

Switch Real-time limit, BHCA	
Lines Served	**BHCA**
1-1,000	10,000
1,000-10,000	50,000
10,000-40,000	200,000
40,000+	600,000

B75. Switch traffic limit, BHCCS

Definition

The maximum amount of traffic, measured in hundreds of call seconds (CCS), the switch can carry in the busy hour (BH). If the model determines that the offered traffic load on an end office switching network exceeds the traffic limit, it will add a switch.

Default Value

Lines	Busy Hour CCS
1-1,000	30,000
1,000-10,000	150,000
10,000-40,000	600,000
40,000+	1,800,000

B76. Switch maximum equipped line size

Definition

The maximum number of lines plus trunk ports that a typical digital switching machine can support.

Default Value

80,000

B77. Switch port administrative fill

Definition

The percent of lines in a switch that are assigned to subscribers compared to the total equipped lines in a switch.

Default Value

0.98

B78. Switch maximum processor occupancy

Definition

The fraction of total capacity (measured in busy hour call attempts, BHCA) an end office switch is allowed to carry before the model adds another switch.

Default Value

0.90

B79. MDF/Protector Investment per Line

Definition

The Main Distribution Frame investment, including protector, required to terminate one line.

Default Value

$12.00

B80. Analog Line Circuit Offset for DLC lines, per line

Definition

The reduction in per line switch investment resulting from the fact that line cards are not required in both the switch and remote terminal for DLC-served lines.

Default Value

$5.00

B81. Switch installation multiplier

Definition

Definition: The telephone company investment in switch engineering and installation activities, expressed as a multiplier of the switch investment.

Default Value

1.10

B82. End Office Switching Investment Constant Term

Definition

The value of the constant ("B") appearing in the function that calculates the per line switching investment as a function of switch line size for an amalgam of host-remote and stand alone switches, expressed separately for BOCs and large independents (ICOs), on the one hand, and for small ICOs, on the other hand. The function is cost per line = A *ln* X + B, where X is the number of lines.

Default Values

BOC and Large ICO	Small ICO
$242.73	$416.11

B83. End Office Switching Investment Slope Term

Definition

The constant multiplying the log function appearing in the EO switching investment function ("A" in the function shown in parameter 4.1.9.) that calculates the per line switching investment as a function of switch line size for an amalgam of host-remote and stand alone switches. This term is the same for BOCs, large independents, and small independents.

Default Value

-14.922

B84. Processor feature loading multiplier

Definition

The amount by which the load on a processor exceeds the load associated with ordinary telephone calls, due to the presence of vertical features, Centrex, etc., expressed as a multiplier of nominal load.

Default Value

The default value is 1.20 for business line percentage up to the variable business penetration rate, increasing linearly above that rate to a final value of 2.00 for 100% business lines.

B85. Business Penetration Ratio

Definition

The percentage of business lines to total line at which the processor feature loading multiplier is assumed to reach the "heavy business" value of 2.

Default Value

0.30

WIRE CENTER

B86. Lot size, multiplier of switch room size

Definition

The multiplier of switch room size to arrive at total lot size to accommodate building and parking requirements.

Default Value

2

B87. Tandem/EO wire center common factor

Definition

The percentage of tandem switches that are also end office switches or are collocated in wire centers with end office switches. This accounts for the fact that tandems and end offices are often located together, and is employed to avoid double counting of land and other wire center investment in these instances.

Default Value

0.4

B88. Power investment

Definition

The wire center investment required for rectifiers, battery strings, back-up generators and various distributing frames, as a function of switch line size.

Default Value

Lines	Investment Required
0	$5,000
1000	$10,000
5000	$20,000
25,000	$50,000
50,000	$250,000

B89. Switch room size

Definition

The area in square feet required to house a switch and its related equipment.

Default Value

Switch Room Size	
Lines	Sq. Feet of Floor Space Required
0	500
1,000	1,000
5,000	2,000
25,000	5,000
50,000	10,000

B90. Construction costs, per sq. ft.

Definition

The costs of construction of a wire center building.

Default Value

Construction Costs per sq. ft.	
Lines	Cost/sq. ft.
0	$75
1,000	$85
5,000	$100
25,000	$125
50,000	$150

B91. Land price, per sq. ft.

Definition

The land price associated with a wire center.